

## ALTERNATIVE RESTORATION APPROACH – LAKE ERIE

### Introduction

This document provides the rationale that the Michigan Department of Environment, Great Lakes, and Energy (EGLE) is using to pursue categorizing Michigan's portion of Lake Erie (AUID MI04120200000101) as Impaired with an Alternative Restoration Approach (ARA) (Category 5-alt) to improve water quality in a more efficient, functional, and expedited process than the near-term development of a Total Maximum Daily Load (TMDL). This Category 5-alt will be used to acknowledge the continued nutrient reduction work being done and to be done following Michigan's Domestic Action Plan (DAP) and Adaptive Management Plan (AMP) developed under Annex 4 of the Great Lakes Water Quality Agreement (GLWQA) (State of Michigan 2018 and 2021, respectively). EGLE understands that a TMDL is needed, but current efforts already underway to meet Water Quality Standards (WQS) are believed to be sufficient in meeting that underlying purposes of the TMDL process; In the case of Lake Erie a restored ecology that returns impaired designated uses to a supporting status.

### Background

While a TMDL is the primary tool that the federal Clean Water Act necessitates to bring impaired surface waters back into compliance with WQS, there are cases where an ARA may be more efficient, more practical, and more successful for improving water quality. The United States Environmental Protection Agency (USEPA), as part of the Long-Term Vision for Assessment, Restoration, and Protection under the federal Clean Water Act Section 303(d) Program, recognized that some "alternative restoration approaches may be more immediately beneficial or practicable in achieving WQS than pursuing the TMDL approach in the near-term" and provided specific guidance for their use in 2015 (Best-Wong 2015). This document explains how, in the case of Michigan's portion of Western Lake Erie Basin (WLEB), the ARA is expected to be more effective at meeting WQS than the development of a TMDL.

In 2016 EGLE assessed Michigan's portion of Lake Erie as impaired for the Other Indigenous Aquatic Life and Wildlife designated use based on repeated, persistent, and extensive blue-green cyanobacteria blooms impacting the western basin of Lake Erie. These blooms were determined to be indicative of excessive/nuisance conditions suggesting ecological imbalance.

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Similarly, the GLWQA Nutrient Annex Subcommittee identified phosphorus target reductions to achieve the following Lake Ecosystem objectives for Lake Erie:

- Minimize the extent of hypoxic zones in the central basin of Lake Erie.
- Maintain algal species consistent with healthy aquatic ecosystems in the nearshore waters of the western and central basin of Lake Erie.
- Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the waters of the western basin of Lake Erie.

Because the latter two objectives strongly parallel the conditions necessary to demonstrate support of Michigan’s impaired Other Indigenous Aquatic Life and Wildlife designated use, the target nutrient reductions and related analyses have been identified as reflective of the WQS attainment goal.

[The Annex 4 Objectives and Targets Task Team Final Report](#) (May 11, 2015) went through a significant deliberative process to identify sources and loading estimates of total phosphorus to Lake Erie. Data from extensive monitoring data sets as well as NPDES discharge monitoring reports were used to develop load estimates by major tributary with particular focus on the Detroit River and the Maumee River watershed, widely acknowledged the two primary sources of total phosphorus. Based on the above goals, the subcommittee set the load targets of 40 percent reductions in total phosphorus entering the western basin, including, and of particular relevance for Michigan, a 40 percent reduction in spring total and soluble reactive phosphorus (SRP) from the River Raisin, and a 40 percent reduction in spring SRP from the Maumee River, some headwaters to which are in Michigan.

Importantly, waters for which an ARA has been identified continue to remain on the 303(d) list of impaired waterbodies, acknowledging the necessity of a TMDL. The 5-alt category, then, is a tool by which states and the USEPA transparently acknowledge actions being undertaken to address the designated use impairment rather than developing a TMDL in the near-term.

Lastly, it is important to note that the state of Ohio’s Maumee River Watershed is the primary source of nutrient loading contributing to the Harmful Algal Blooms (HABs) expressed in the WLEB (Verhamme et al., 2016). Michigan’s portion of the WLEB is highly influenced and impacted by the nutrient loading from the Maumee River, which is in close proximity to the Michigan and Ohio state borders. Ohio is pursuing its own processes to address nutrients in this priority watershed, including work under Annex 4 (Nutrients) of the 2012 GLWQA.

### Rationale for Pursuing an Alternative Restoration Approach

There is ongoing interest in understanding Michigan’s approach to addressing the nuisance algal conditions in open waters of Lake Erie. Currently, EGLE does not believe a TMDL is the best way to reducing the frequency of unacceptable nuisance algal blooms in WLEB. The problems being experienced in Lake Erie are due to multinational sources of nutrients. The multi-state and multinational framework that the 2012 GLWQA established under Annex 4 (Nutrients) offers a much more relevant process to address the shared issue of nutrient pollution rather than disparate state-based TMDLs and no unified multinational approach (Great Lakes Water Quality Agreement, Nutrients Annex Subcommittee, 2019).

Michigan could develop a TMDL that would incorporate the required nutrient reductions needed to meet the targets established for its portions of the WLEB. That would allow the State the regulatory authority to reduce contributions from NPDES permit facilities. However, to date, the Water Resources Division (WRD) of EGLE has identified the needed NPDES reductions from permitted point source facilities and those facilities are meeting the required reductions. Importantly, there seems to be a misconception that developing a TMDL for Michigan’s portion of Western Lake Erie would provide more regulatory authority over the various nonpoint source contributions. After an extensive review of existing Legislation, the state’s current Rules governing nonpoint source contribution, and discussions with the USEPA, EGLE has determined that a TMDL does not offer any additional nonpoint source regulatory authority. At this time, lacking state or federal authority over nonpoint source contributions, true nonpoint source nutrient reductions can only be achieved through voluntary measures under any approach.

One typical TMDL requirement is the development of nutrient loading estimates for permitted and nonpoint sources. EGLE’s WRD is developing watershed planning projects that will identify nonpoint source loading reduction targets down to the hydrologic unit code 12 (HUC-12) subwatershed scale. Those sources/loads will be targeted through the adaptive management process outlined the Michigan’s AMP and through water quality monitoring in various locations in the subwatersheds of Michigan’s portion of the WLEB watershed (State of Michigan, 2021).

EGLE considers the following factors as relevant to the decision to pursue an ARA for Michigan’s portion of Lake Erie (AUID MI041202000001-01):

1. Lake Erie is a multi-jurisdictional waterbody with multiple states and two countries with ownership, responsibility for protection, and the potential for impacting its water quality. As a multi-jurisdictional waterbody, the approach to addressing water quality issues must occur at a scale that is meaningful and holistic. The binational 2012 GLWQA Annex 4 (Nutrients) Subcommittee, led by U.S. EPA and Environment Climate Change Canada, work collaboratively with the Province of Ontario and the states of Michigan, Indiana, and Ohio

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to develop and implement DAPs that outline meaningful actions to address this water quality challenge.

2. The sources of the nutrients to the western Lake Erie Basin have been well studied and investigated under Annex 4, including some of the driving mechanisms behind the cyanobacteria bloom intensities in the lake, through such efforts as the development of Recommended Phosphorus Loading Targets by the Objectives and Targets Task Team ([Final report to the Nutrients Annex Subcommittee, May 11, 2015](#)), and [Great Lakes Water Quality Agreement Nutrient Annex 4 Objectives and Targets Development Task Team Multi-Modeling Report](#) (Submitted to the USEPA, Region 5, August 31, 2016). While mechanisms to address point sources are in place based on the NPDES permit program and its ability to control phosphorus in keeping with the Plant Nutrients criteria (Rule 323.1060(1) of the Part 4 WQS), nonpoint source inputs lack a regulatory control. Because of this, the expansive, multi-jurisdiction nonpoint source inputs in this heavily agricultural watershed lend themselves to the importance of the partnerships and collaboration developed through the GLWQA and nutrient reduction work already underway (e.g., HAB research, Best Management Practices [BMPs] effectiveness), as described further in the crosswalk table.
3. There is broad involvement in efforts underway by Michigan, Ohio, Indiana, Ontario, and broad stakeholder and public support for the unified approach that Annex 4 Subcommittee and the DAPs provide. This broad involvement and support in the alternative restoration approach is important for timely progress in implementation; additional details on support and partnerships can be found in the crosswalk table (Table 2).

Michigan's portion of Lake Erie (AUID MI041202000001-01) is appropriate for consideration of an ARA for the reasons in Table 1, following Best-Wong (2015). Additional details to these Summary discussions can be found in Table 2, with pertinent crosswalk to existing relevant plans:

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**Table 1. Alternative Restoration Approach Rationale Support**

Rationale	Summary
Unique Local Circumstances	<p>Because the western basin of Lake Erie is a binational water, shared between Canada and the U.S., and additionally managed or heavily influenced by multiple states on the U.S. side including Michigan, Ohio, and Indiana, addressing water quality concerns at the multi-state and multi-national level scale is important. Annex 4 (Nutrients) of the GLWQA provides a meaningful spatial and multi-jurisdictional structure for addressing nutrient pollution in the western basin of Lake Erie. Agreements like the 2012 GLWQA and subsequent 2015 Western Basin of Lake Erie Collaborative Agreement, which set a commitment to achieving a 40% phosphorus reduction goal set by the Annex 4 Subcommittee, are in place to address the broad scale of nutrient sources affecting the western basin of Lake Erie (Michigan Department of Environmental Quality, WRD, 2016). These policy documents provide a framework under which DAPs have been formulated and actions underway by each state and province toward address nutrient pollution from both point and nonpoint sources that address their own unique, local circumstances.</p>
Mechanisms to Address All Sources	<p>The sources of nutrients associated with Michigan’s impairment listing come from both point and nonpoint sources. While the NPDES permit program contains mechanisms for addressing point-source contributions, the techniques for addressing nonpoint sources of nutrients are established in literature, research, and in practice through the application of BMPs. Critical to their success will be the implementation of best practices at a meaningful scale in three priority watersheds identified in the Michigan DAP and AMP (i.e., the geographic units of the River Raisin, St. Joseph River, and Bean Creek) in Michigan’s portion of the portion of the Lake Erie Basin to achieve the desired nonpoint source reductions (State of Michigan, 2018; State of Michigan, 2021).</p>
Stakeholder and Public Support	<p>The Western Basin of Lake Erie Collaborative Agreement set the stage for coalescing support for a unified, timebound commitment to address nutrient pollution in the western basin Lake Erie watershed (Michigan Department of Environmental Quality, WRD, 2016). Under Annex 4 of the GLWQA, the development of Michigan’s 2018 DAP was completed by the Quality of Life Agencies (EGLE, MDARD, MDNR). The entire effort involves partners within Michigan’s portion of the Lake Erie watershed including the regulated community, Conservation Districts, local governments, nonprofit organizations, and watershed organizations. The DAP and AMP specifically call for improving and increasing outreach to the public and farmers to promote understanding of the basin and good conservation practices by initiating new targeted outreach campaigns, workshops, field demonstrations and information sharing (see Task 9 in the Appendices). In addition, Michigan’s AMP specifically notes the formation of a WLEB science-based advisory group to provide stakeholder feedback and technical input throughout the adaptive management process.</p>

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### Alternative Restoration Approach Elements

Following guidance from the USEPA, Michigan’s pursuit of the ARA for Lake Erie relies on both Michigan’s DAP (State of Michigan, 2018) and Michigan’s AMP (State of Michigan, 2021). These plans provide reference for the identification of important elements described in Best-Wong (2015); Table 2 provides a crosswalk between the identified elements and relevant portions of these two Michigan specific plans

Table 2. Category 5-Alternative Review Element Crosswalk

Review Element	Summary	DAP Source (page/paragraph, Section)	AMP Source (page/paragraph, Section)
Identification of Specific Impaired Water Segments	2016 IR Identified all Michigan waters of Lake Erie as impaired for OIALW designated use based on nutrient inputs. (AUID MIO41202000001-01; approximately 114 square miles of Great Lakes open water, 37.5 miles of Great Lakes shoreline)	Page 5, ¶3	Page. 12 ¶2; Page C-2 “Western Lake Erie TMDL”
Analysis to support why the State believes that the implementation of the alternative restoration approach is expected to achieve WQS.	Because the western basin of Lake Erie is a binational water, shared between Canada and the U.S., and additionally managed or heavily influenced by multiple states on the U.S. side including Michigan, Ohio, and Indiana, addressing water quality concerns at the multi-state and multi-national level scale is important. Annex 4 (Nutrients) of the GLWQA provides a meaningful spatial and multi-jurisdictional structure for addressing nutrient pollution in the western basin of Lake Erie. Agreements like the 2012 GLWQA and subsequent 2015 Western Basin of Lake Erie Collaborative Agreement, which set a commitment to achieving a 40% phosphorus reduction goal set by the Annex 4 Subcommittee, are in place to address the broad scale of nutrient sources affecting the western basin of Lake Erie (Michigan Department of Environmental Quality, WRD, 2016). These policy documents provide a framework under which DAPs have been formulated and actions underway by each state and province toward address nutrient pollution from both point and nonpoint sources that address their own unique, local circumstances.		Page C-2 “Western Lake Erie TMDL”



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Review Element	Summary	DAP Source (page/paragraph, Section)	AMP Source (page/paragraph, Section)
<b>Identification of All Sources Contributing to Impairment</b>	<p>The sources contributing excess nutrients to the western basin of Lake Erie are broad, including both point sources and extensive nonpoint sources. Target reductions in loadings from various Michigan tributaries (Detroit River, River Raisin, and Michigan portions of the Maumee River watershed) were identified as a priority by the Objectives and Targets Task Team under Annex 4 of the GLWQA (citation 2015); Additional analyses to develop phosphorus loadings at a HUC 12 scale were conducted for the priority watersheds. Appendix 1 of DAP identifies broad reductions in tributary sources needed. The AMP specifically identifies the River Raisin, St. Joseph River, and the Bean Creek Watersheds as priority geographies. Specifically, the AMP calls for agriculture inventories in the Bean Creek and River Raisin Watersheds with the goal of implementing agriculture inventories in all of Michigan's portion of the Lake Erie Basin.</p>	<p>Page 6 “Objectives”; Page 11 “Michigan Point Sources” and “Michigan Nonpoint Source Program”; Appendices 1 &amp; 2</p>	<p>Page 9.Table 1; Page 22, “Program Tactics and Selected Management Actions for Measurement and Investigation”; Page 23 Figure 12; A-1 Appendix A DAP Task Tracking Table; Page 40 “CAFO &amp; GAAMPs” ¶2</p>
<b>Action Plan or Implementation Plan to document ACTIONS to address sources and a SCHEDULE of milestones</b>	<p>The DAP, broadly, identifies actions to address point and nonpoint sources while the AMP provides more specificity in the approach. Appendix 2 of the DAP highlights specific sources, related tasks, involved parties, timelines, and milestones working toward addressing reductions needed toward achieving goals.</p> <p>Similarly, Appendix A of the AMP spells out tasks and their responsible parties, milestones, and status with more detail. For example, specific actions completed/ongoing related to point source reductions (Tasks 1 and 2), and additional information on nonpoint source actions like the development of the Bean Creek Watershed Management Plan (a priority watershed; Task 3d) and the development of a study to evaluate tile line control practices to reduce nutrient discharges (Task 5e).</p> <p>In addition, the AMP also identifies a suite of adaptive management projects to address sources under the Program Tactics and Selected Management Actions for Measurement and Investigation section of the document.</p>	<p>Page 6 “Actions Moving Forward”; Appendix 2</p>	<p>Page 10 Figure 2; Page 22, “Program Tactics and Selected Management Actions for Measurement and Investigation”; Appendix A</p>

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Review Element	Summary	DAP Source (page/paragraph, Section)	AMP Source (page/paragraph, Section)
Identification of Funding Opportunities to implement	Funding is available through programs such as Great Lakes Restoration Initiative, the state's General Fund, EGLE's Nonpoint Source Program, MDARD's Conservation Reserve Enhancement Program (CREP), Regional Conservation Partnership Program, and Michigan Agricultural Environmental Assurance Program. Other areas where additional funding will be critical to implementation are identified.	Page 11 "Michigan Nonpoint Source Program"; Page 13 ¶2; Page 16 ¶2 Page 18 "Agricultural Practices Accomplishments"	Page 28, 30 Appendix A
Identification of Committed Parties and/or additional parties needed	The June 2015 signing of the Western Basin of Lake Erie Collaborative Agreement between Michigan, Ohio, and the Province of Ontario was a formal commitment toward restoring Lake Erie. Subsequent to that Agreement, the Quality of Life Agencies in Michigan became the primary members of the DAP Team who, with other key partners and agencies, are tackling Lake Erie's nutrient issues together. Additionally, Appendix 2 of the DAP highlights many of the parties committed to implementation of identified actions. Appendix A of the AMP notes the many existing partners involved in each identified task. and the commitment to form a WLEB stakeholder advisory group.	Appendix 2	Pages 1, 18, 21-22 "DAP Team and Advisory Group Roles and Responsibilities"; Page 31-32 "Improve and Increase Outreach to the Public and Farmers" Appendix A
Estimate/Projection of timeline to WQS being met	Nutrient reduction timelines have been set with incremental goals in 2020 and final reductions to be achieved in 2025. Importantly, the time to realize associated designated use support is acknowledged to likely lag in response to nutrient reductions. This uncertainty is reflected in Michigan's commitment to continuing to track both load reductions as well as Lake Erie's response toward meeting the ecological goals. Michigan has demonstrated that the interim 20% phosphorus reduction by 2020 goal set under the Collaborative Agreement has been met by way of point source reductions but acknowledges that the final 40% load reduction goals being met in 2025 will be highly dependent on nonpoint source load reduction success, as described in the AMP.	Page 10 "Lake Erie Biological Response;" Page 21 Appendix 1	Pages 6-7, 9-10, specifically "Table 1. Phosphorus load reduction goals reproduced from the 2018 Michigan DAP"



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Review Element	Summary	DAP Source (page/paragraph, Section)	AMP Source (page/paragraph, Section)
Plans for Effectiveness Monitoring to demonstrate progress and need for adaptive management	Both the DAP and AMP include actions that are in process or being planned to measure and track progress toward nutrient load reductions. Both documents identify metrics focused on both point and nonpoint sources. An adaptive management approach at a Lake Erie basin, and Michigan-specific level will help evaluate progress and identify directions for additional research and implementation.	Page 7 "Measuring Progress"; Page 8 "Metrics to Track Progress" and "Adaptive management"	Pages 8-10; Page 17, Page 41 "Performance Measures and Benchmarks;" Appendix A
Periodic Evaluation of Alt approach to determine if on track vs. TMDL	Many of the plans described in the DAP for measuring and tracking progress toward nutrient load reductions are relevant in evaluating the overall movement toward restoration goals. Additionally, the AMP describes plans for Annual reports to be released covering management activities, monitoring/modeling results, nutrient reduction progress and lessons learned. Routine external communications are also planned along with reporting out to stakeholder groups.	Page 7 "Measuring Progress"; Page 8 "Metrics to Track Progress"	Page 22, "Program Tactics and Selected Management Actions for Measurement and Investigation;" Page 39; Page 42-45 "Schedule and Reporting Progress for the Adaptive Management Plan and Outreach and Engagement"; Appendix A

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### References

- Best-Wong, B. 2015. Information Concerning 2016 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions. Memorandum to EPA Water Division Directors, Regions 1-10. August 13, 2015.
- Great Lakes Water Quality Agreement, Nutrients Annex Subcommittee, June 2019. Lake Erie Binational Phosphorus Reduction Strategy, 29 p.  
[https://binational.net/wp-content/uploads/2019/06/19-148\\_Lake\\_Erie\\_Strategy\\_E\\_accessible.pdf](https://binational.net/wp-content/uploads/2019/06/19-148_Lake_Erie_Strategy_E_accessible.pdf).
- Michigan Department of Environmental Quality, Water Resources Division, 2016. Michigan's Implementation Plan, Western Lake Erie Basin Collaborative, January 14, 2016.  
[Michigan.gov/Documents/DEQ/WRD-Western-Lake-Erie\\_503547\\_7.pdf](https://Michigan.gov/Documents/DEQ/WRD-Western-Lake-Erie_503547_7.pdf)
- State of Michigan, 2018. State of Michigan - Domestic Action Plan for Lake Erie. February 28, 2018. Prepared by State of Michigan Quality of Life departments including the Michigan Department of Agriculture and Rural Development, Michigan Department of Environmental Quality, and Michigan Department of Natural Resources.  
[Michigan.gov/Documents/EGLE/WRD-GLC-DAP\\_665997\\_7.pdf](https://Michigan.gov/Documents/EGLE/WRD-GLC-DAP_665997_7.pdf).
- State of Michigan, 2021. Michigan's Adaptive Management Plan to Reduce Phosphorus Loading into Lake Erie, Draft. Prepared by State of Michigan Quality of Life departments including the Michigan Department of Agriculture and Rural Development, Michigan Department of Environmental Quality, and Michigan Department of Natural Resources.  
[Michigan.gov/Documents/EGLE/WRD-Great-Lakes-Michigan-AMP\\_743812\\_7.pdf](https://Michigan.gov/Documents/EGLE/WRD-Great-Lakes-Michigan-AMP_743812_7.pdf).
- Verhamme, E.M., Redder, T.M., Schlea, D.A., Grush, J., Bratton, J.F. and DePinto, J.V., 2016. Development of the Western Lake Erie Ecosystem Model (WLEEM): Application to connect phosphorus loads to cyanobacteria biomass. Journal of Great Lakes Research, 42(6):1193-1205.